Lat 40.62651 Lon -121.04275

Forest Health Protection

Pacific Southwest Region

Date: August 25, 2003
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To: Forest Supervisor, Lassen National Forest

Subject: Evaluation of Crater Lake Campground (FHP Report NE03-06)

At the request of Dave Reis, Forest Landscape Architect, I conducted a field evaluation of the Crater Lake Campground, Eagle Lake Ranger District, on August 4, 2003. The objective of my visit was to evaluate the current forest health conditions within and adjacent to the campground and to provide management recommendations for use in the design of future campground modifications and campsite locations.

Background

The Crater Lake Campground is located on the Lassen National Forest, about 24 miles northwest of Susanville, at an elevation of 6800 feet. Precipitation for the site averages approximately 40 inches per year. There are 17 developed campsites that are used seasonally from early June through mid-October. The north half of the campground is on a south facing slope and the south half is mostly in the bottom of a shallow drainage with a portion extending slightly up the adjacent north facing slope. The forested area in and around the campground is occupied by a mix of Jeffrey pine (*Pinus jeffreyi*), white fir (*Abies concolor*), red fir (*Abies magnifica*), lodgepole pine (*Pinus contorta*) and quaking aspen (*Populus tremuloides*). The lodgepole pine and quaking aspen are found mostly associated with the perimeter of the lake and along the small drainage that runs from the east rim of the crater down through the campground

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to the lake. Most lodgepole pine trees within the campground are pole sized or greater while seedlings are mostly absent.

Scattered mature Jeffrey pine make up the overstory within the north half of the campground while white fir, lodgepole pine and aspen make up the overstory within the south half as well as the mid and understory layers throughout the entire campground. Few sapling and pole size Jeffrey pines exist within the campground and there is a near complete lack of seedlings.

Observations

Mountain pine beetle (*Dendroctonus ponderosae*) is actively attacking and killing lodgepole pine where it exists in small pure stands within the basin (Figures 1 and 2). This activity has been occurring over the past few years as evidenced by the numerous stumps, resulting from hazard tree removal, in and around the campground. Mortality is mainly associated with the larger trees and has resulted in significant openings within the stands. Most of the larger lodgepole pine within the campground have been killed and subsequently removed. There are currently two dead lodgepole trees in campsites near the lake and two green infested trees between the restrooms and the lake.

Figures 1 and 2. Lodgepole pine killed by mountain pine beetle.

Several extremely dense lodgepole pine thickets, consisting primarily of sapling to pole size trees, occur on the eastern edge of the campground that are showing signs of western gall rust (*Peridermium harknessii*) and stalactiform rust (*P. stalactiforme*). Some of the larger trees in these stands have sustained some injury to their cambium layers in the upper bole due to feeding by Douglas squirrel (*Tamiasciurus douglasii*) and a few have been killed by mountain pine beetle. There is also evidence of mechanical injury on many trees resulting from campers hammering nails into trees and/or cutting into trees with hatchets or saws (Figure 3).

Aspen is a large component of the area and is successfully regenerating only in rocky outcrops adjacent to the campground. Numerous aspen suckers were observed among the campsites but most have either been trampled by humans or browsed by deer. Conifer encroachment, mainly

by white fir and lodgepole pine, is impacting some of the aspen stands by overtopping and shading the smaller aspen stems. In addition, many of the mature aspen stems have also sustained injury from campers carving initials and/or drawings into the bark (Figure 4).

Figure 3. Hatchet wound on lodgepole pine.

Figure 4. Carving in mature aspen stem.

The large Jeffrey pine that are growing within the campground appear to be in good health but in adjacent, more densely stocked, stands there has been recent Jeffrey pine beetle (*Dendroctonus jeffreyi*) caused mortality in trees of similar size and age.

White fir is scattered throughout the campground and appears healthy although dense stands adjacent to the campground are showing signs of recent fir engraver (*Scolytus ventralis*) caused mortality.

High foot and vehicle traffic is occurring in and around some of the campsites. This is evidenced by the lack of vegetation in many areas and is likely resulting in highly compacted soils around tree roots in addition to direct root damage. This condition is mostly found at campsites within the lodgepole pine stands where there are fewer rocks to inhibit foot traffic.

Discussion and Recommendations

Trees in the Crater Lake campground, similar to most forested campgrounds, are exposed to additional stress factors that can compromise their health and vigor. Firewood collecting sometimes leads to tree wounding from hatchets and saws, foot and vehicle traffic from campers can result in increased soil compaction and root damage, and the desire for screening between campsites can result in overstocking of understory trees.

Soil compaction within the campground may be partly responsible for predisposing the lodgepole pine trees to mountain pine beetle attacks. Compacted soils tend to suffocate roots,

limiting the available oxygen that is necessary for root growth and survival. Damaged and unhealthy roots cannot provide the upper portions of the tree with the water and nutrients it requires to maintain its natural defenses. Root damage is a long-term problem that may not reveal itself until several years after the damage has occurred. In order to minimize future soil compaction and root damage, campers should be confined to specific travel corridors from campsites to restrooms, water sources, and specific recreation areas. It is especially important to divert and limit foot and vehicle travel as much as possible from the root zones of trees.

Regardless of the effects of compaction and root damage, lodgepole pine trees typically become susceptible to mountain pine beetle attacks when they are over 80 years of age, 8 inches or greater in diameter, and in monoculture stands. Therefore, to maintain a lodgepole pine component within the campground trees must be managed for periodic regeneration.

Although the overall stocking level within the campground is not especially high, there are some dense thickets that would benefit from hand thinning. When thinning trees in the campground, it is recommended that you select for a mix of tree species with priorities given to Jeffrey pine and aspen. It is probable that these two species dominated this site before the lack of naturally recurring fire allowed for the encroachment of lodgepole pine and white fir into the understory. In addition, when selecting trees for removal, preference should be given to trees infected with western gall rust, trees infested with bark beetles and trees with extensive animal damage or human caused injuries. It is important to note that when implementing a hand or commercial thinning in a recreational site Region 5 direction calls for the treatment of all conifer stumps with a registered borate compound to reduce the probability of infection by *Heterobasidion annosum*, the causal agent of annosus root disease.

Dense stands adjacent to the campground would also benefit from thinning. Mechanical thinning may be more appropriate for these stands, due their high tree density and larger area, and would increase tree health and vigor, reduce bark beetle related mortality and result in fewer hazard trees. In addition to reducing tree stress, thinning and fuels treatment, especially of the understory, will somewhat reduce the risks and damage from any fire that might occur and provide a more defensible space for the campground.

To prevent mountain pine beetle related mortality in the short term a couple of management options exist; direct control through the removal of green infested lodgepole pine or applications of insecticides to uninfested tree boles. Although there is no general agreement regarding the effectiveness of direct control of mountain pine beetle, some success has been observed in Donner Camp, Tahoe National Forest. To implement this management option, green infested lodgepole pine must be identified and removed promptly. This would require annual or bi-annual tree inspections and subsequent removal of infested material prior to beetle emergence. The second short-term preventative measure would be the use of insecticides on tree boles. All non-infested trees greater than 8” DBH in the campgrounds would be treated with a registered pesticide by spraying as much of the bole as possible. Trees would need to be treated prior to mid-May 2004, before the first beetle flight, to be effective. Insecticide treatments can provide protection up to two years against bark beetle attacks giving the Forest/District time to develop and implement long-term strategies to reduce overall tree susceptibility. Consideration needs to be given to the choice of insecticide since the campground is in close proximity to the lake.

Aspen is probably the species that would regenerate the quickest within the campground and provide immediate screening between campsites and future shading where openings have been created through conifer mortality. Currently, the aspen regeneration is being hindered by factors such as trampling by humans, browsing by deer and shading by conifers. This lack of successful regeneration will eventually reduce the aspen component within the campground leading to the potential loss of aesthetic/visual qualities, as the presence of aspen is a highly desirable component of recreational sites. To increase successful aspen regeneration it is recommended that all existing aspen suckers be protected from browsing and trampling until they reach a suitable height (at least 5 feet). This could be accomplished by placing temporary wire cages around suckers for as long as necessary. Thinning competing conifers to allow more sunlight and growing space will enhance the growth of existing suckers and may stimulate the growth and spread of existing aspen clones.

Maintaining and promoting healthy trees are important objectives of the development plan for the Crater Lake campground area. Care should be taken during future campsite and facility construction to minimize negative impacts on the landscape. The following guidelines should be applied for areas under construction or in areas where future construction will take place.

- Tree density should be appropriate for the site. This will provide access to light, moisture and nutrients and allow the trees to better cope with their altered environment.
- Trees that will directly interfere with structures or that will be seriously damaged during construction or excavation should be removed.
- Leave a mixture of ages and species to provide a continual forest canopy over the years.
- Fence off individual or groups of trees before construction to negate or minimize root damage by soil compaction or trunk and root damage by equipment. Protective fences should be placed, at a minimum, at drip line. Depending on the species, tree roots can exist within a radius two times the crown radius and encompass an area well beyond drip line. Drip line is defined by the outer edge of the foliage.
- Road or lot grades should be changed as little as possible. Grading damages roots and can set up conditions that favor soil erosion. It can also alter the contour such that the flow of surface and subsurface water is drastically affected.
- Trenches should always be dug away from tree roots.
- Do not back fill with earth or rocks around the trunks of trees.
- Avoid paving with either concrete or asphalt over root systems, or close to the trunks of trees.
- Use caution in applying wood preservatives and other chemicals to buildings. Trees and other plants have been killed by direct contact with them or as a result of their runoff in rainwater.
- Avoid leaving green pine slash on site to prevent the build up of pine engraver (*Ips pini*) beetle populations that may attack standing green trees.

Existing or future construction that incorporates the above guidelines will help assure the existence of vigorous and healthy trees following project completion.

Despite the effectiveness of any long or short-term plans to prevent tree injury and mortality,

some trees, through declining health, will eventually become hazards to the public. To minimize the risks associated with hazard trees they should be identified and removed before they fail. The current practice for campgrounds on the Lassen National Forest is to remove trees as they die. This eliminates the risk from dead trees but fails to address living trees that are infected with root disease, heart rot, and/or have a structural defect. These high-risk green trees are equally hazardous and should not be overlooked. Therefore, it is recommended that the Forest develop a hazard tree evaluation and monitoring plan for its recreational sites. At your request, Forest Health Protection can provided information and assist with the development of this plan. In the short-term, the previously noted dead lodgepole pine and the existing mountain pine beetle infested green lodgepole pine within the campground should be removed as soon as possible.

Conclusion

Any future modifications to the Crater Lake campground should incorporate a long-term vegetation management plan. The recommendations provided in this evaluation combined with input from the District and/or Forest silviculturist will help insure the continued presence of healthy trees that will provide shade, campsite screening and visual/aesthetic qualities for the Crater Lake campground.

Forest Health Protection can assist with the funding for thinning and removing green material from overstocked areas and insecticide treatments within and adjacent to the Crater Lake campground. If you are interested in this funding please contact any of the Forest Health Protection entomology staff for assistance in developing and submitting a proposal.

If you have any questions regarding this report and/or need additional information please contact me at 530-252-6431 or at dcluck@fs.fed.us.

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